

OBSERVATIONS ON THE BLIND CRAYFISHES OF INDIANA, WITH
A DESCRIPTION OF A NEW SUBSPECIES; *CAMBARUS PELLUCIDUS* TESTII.

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(With Plates XLIV-XLV.)

During the summers of 1891 and 1892, while visiting the caves of southern Indiana, an opportunity was afforded me to observe the habits and to collect specimens of the blind crayfish, *Cambarus pellucidus*.

The first cave visited is known as Mayfield's Cave and is situated about 3 miles west of Bloomington, Monroe County. Here nine specimens of a peculiar variety were caught and consigned to the alcohol bottle.

No more crayfishes were seen until I reached Bedford, in Lawrence County, although it is possible that they existed in the caves between the two places. The failure to find specimens was due to the heavy autumn rains which had so muddied the subterranean streams as to obscure everything in them.

Near Bedford, in Down's Cave, I collected two small specimens.

At Shiloh cave, 2 miles farther to the west, they were very common.

This cave is a capacious one, and is traversed by a good-sized stream which will average a foot in depth. The bottom is of gravel and full of small stones which have fallen from the ceiling. A few crayfish were found here, but it was in a small branch running into the large stream about one-eighth of a mile from the entrance of the cave that they were the most abundant. The bottom of this branch is composed almost entirely of an exceedingly fine clay, with here and there a large rock which affords a ready hiding place for the animals.

When first observed, the crayfish were generally, I might almost say always, resting quietly in some shallow part of the stream on one of the banks of clay. They lay with all their legs extended and their long antennae gently waving to and fro. Once or twice I saw them on the shore a foot, at least, from the water, and one of these appeared to have been digging in the soft mud. When in the water I found it almost impossible to catch them with the net, and after a few trials threw it aside as useless. A much surer method was to approach them slowly

with the hand and then suddenly seize them. When once touched they started off in great haste for some protecting rock, but often in their alarm would dart out upon the bank where they would lie unable to get back to the water. They did not appear to be at all sensitive to the light. I have often tried the experiment of slowly passing my candle back and forth a few inches above them, or of suddenly removing the light and then bringing it close again, but with no effect whatever.

Noise has no effect; a loud call or a shrill whistle they do not notice. Nor does disturbing the waters seem to affect them, and it is only when they are touched that they manifest fear.

The larger of these crayfishes could inflict a pretty severe nip with their pinchers, but they did not appear to be so strong in this regard as the outside species.

When first taken from the water they were of a translucent pinkish white color with the stomach showing through as a blue body, but immersion in alcohol soon changed the color to an opaque white and obscured all traces of the internal organs.

At my first visit to Shiloh Cave I obtained sixteen specimens and on the second visit thirty-five.

I was unable to find more specimens of the blind crayfish until I reached Paoli in Orange County. Near this town I visited a small cave and obtained two specimens. At Orangeville, a little north of Paoli, they are said to be quite common in Lost River. At Marengo Cave the guide informed me that a few specimens had been obtained. At Wyandotte Cave they are said to be, at some seasons of the year, quite common, but at the time of my visit I secured only one small specimen. However, in a small unnamed cave, about one-fourth of a mile distant from the main cave, I obtained three fine specimens and observed another, which managed to escape. I was informed that they were abundant in other caves in the vicinity.

After reaching home, a careful examination of the collection brought out the following facts—

Of thirty specimens from Shiloh Cave, fourteen were males and sixteen females. It needed very little examination to determine that they belonged to the species *Cambarus pellucidus*, but rather to the variety which Prof. Cope has described as the variety *inermis* than to the typical form. The variation in the length of the rostrum and in the general spininess is very great. A complete series can be formed beginning with individuals provided very liberally with lateral spines and whose rostrum bears two sets of teeth near the acumen, and then running down to specimens which have the rostral teeth represented by only a salient angle and with very weak lateral spines. All the specimens, however, had *some* spines, on the sides of the carapace, postorbital ridges, or rostrum. It was in only one specimen, a female, that the rostral spines were missing.

Of the fourteen males, only one possessed hooks on both the third and fourth pairs of legs; the rest had them on the third pair only. In two cases, however, the hook on the fourth pair of legs is represented by a low, almost indistinguishable tubercle. This is also the case with one of the specimens from Wyandotte, and very close to the typical form. The Shiloh specimens with two pairs of hooks have the anterior ones rather strong and somewhat curved toward the base of the legs. The posterior pair are about half the length of the anterior. The hooks of the other specimens are of the same form, but are generally not so strongly developed. The specimens with a single pair of hooks probably belong to the second form of Hagen.

It may also be stated that, as a rule, *Cambarus pellucidus* is smoother the further north it occurs. The material which I have collected myself, and all that I have been able to obtain from others, will uphold me in this statement.

The small cave near Wyandotte produces individuals of exceeding spininess, it being the exception to find there a comparatively smooth one.

Coming further north, to Paoli, we can find much smoother specimens, and at Shiloh they are smoother still, while at Mayfield's Cave, in Monroe County, occurs a form entirely without spines. So constant is this feature of smoothness in the Mayfield Cave specimens and so different is its appearance from the typical *pellucidus*, that I think it is worthy of being characterized as a subspecies.

Cambarus pellucidus testii, subsp. nov. Pl. XLIV.

Cambarus pellucidus Packard. Monograph Cave Animals of N. A., Mem. Nat. Acad. Sci. Vol. IX, No. 9., p. 16.

Cambarus pellucidus Faxon. Notes on N. A. Crayfishes, Proc. U. S. Nat. Museum, Vol. XII, p. 621.

My attention was first drawn to the peculiar form of blind crayfish from Mayfield's Cave, by my friend, Mr. Frederick C. Test, of the U. S. National Museum, who sent me three specimens collected by him in 1888.

On account of the presence in these specimens of hooks on only the third pair of legs of the male, and other peculiarities, I was much inclined to think that they belonged to an entirely new and undescribed species, and it was for the express purpose of collecting additional specimens that Mayfield's Cave was visited by me.

The crayfishes are not very abundant, only nine being taken. They ranged in length from 24 to 68 millimeters. Six were males and three females.

They differ from *C. pellucidus* in the great reduction of the spines. Instead of being rough and very spiny, as the typical specimens from Mammoth Cave are described as being, they are entirely smooth. The lateral rostral spines are wholly gone, the post-orbital ridges are

smooth and rounded at the end, and the lateral spines of the carapace are at best represented by a few low, smooth tubercles.

The rostrum is shortened still more than in Prof. Cope's *inermis*, and instead of being "deeply sinuated to form the acumen," runs to a point in a gradual curve, very much resembling in this respect *C. acuminatus*.

The portion of the carapace in front of the cervical groove is shorter than in the average of specimens from Shiloh Cave, and conspicuously shorter than in specimens from Mammoth Cave. In respect to the hooks on the legs of the males I find the species variable. In none do I find hooks on both legs of the fourth pair; generally they are wholly wanting, but in some there is a small tubercle on one leg, which is missing from the other. The hooks on the third pair of legs are of a slightly different form from those of specimens from Shiloh or Wyandotte. They are shorter, blunter, and not curved.

The first abdominal appendages of the males do not differ in any respect from those of the typical *C. pellucidus*.

In the female the annulus ventralis shows marked differences from the typical forms.

The antennal scales, also, are different in form, and especially in length.

Were it not for a few specimens collected at Shiloh and one from Wyandotte, which in a few characteristics seem to approach the new variety and show an incomplete gradation into the typical form, I would feel justified in considering these Mayfield specimens as a distinct species.

More recently, Truett's Cave, a short distance from Mayfield's, has afforded one specimen of the new variety.

It would thus appear that *C. pellucidus testii* occurs only in those caves which form the most northern and outlying part of the cave region of southern Indiana.

Following is a list of the localities in Indiana from which blind crayfish have been taken. It will be seen that they are scattered over a large part of the southern half of the State, and subsequent exploration will probably show that they exist in every cave provided with running water.

Truett's Cave, Monroe County; Mayfield's Cave, Monroe County; Shiloh Cave, Lawrence County; Down's Cave,* Lawrence County; Dunnihue's Cave, Lawrence County; Connelly's Cave,* Lawrence County; Donnelson's Cave, Lawrence County; cave at Clifty, Bartholomew County (F. C. Test, J. F. Newsom); cave near Paoli,* Orange County; Marengo Cave, Orange County; Wyandotte Cave, Crawford County; small cave near and southwest of Wyandotte Cave; Wild Cat Cave, near Wyandotte; "caves in Harrison County;" "caves near Madison."

* It may be interesting, that among the many caves in which I observed *C. pellucidus*, these marked with an asterisk contained both it and *C. Bartolii*.